

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)
)
Policies and Rules for the Direct) IB Docket 98-21
Broadcast Satellite Service)

COMMENTS OF SKYBRIDGE

SkyBridge L.L.C. ("SkyBridge"), by its attorneys, hereby submits its comments on the Notice of Proposed Rulemaking ("NPRM") in the above-captioned proceeding.^{1/} SkyBridge is an applicant for a Commission license for authority to launch and operate the "SkyBridge System," a global nongeostationary ("NGSO") satellite system, which will provide a wide range of data, voice, and video broadband services in the Fixed-Satellite Service ("FSS") in the Ku-band.^{2/} In particular, SkyBridge proposes to operate downlinks in the 12.2-12.7 GHz band, which is allocated in the United States to the geostationary orbit ("GSO") Broadcasting-Satellite Service ("BSS").^{3/} The SkyBridge

^{1/} Policies and Rules for the Direct Broadcast Satellite Service, Notice of Proposed Rulemaking, FCC 98-26 (Feb. 26, 1998) ("NPRM").

^{2/} See Application of SkyBridge for Authority to Launch and Operate the SkyBridge System, File No. 48-SAT-P/LA-97, February 28, 1997 (the "SkyBridge Application"); Amendment, File No. 89-SAT-AMEND-97, July 3, 1997 (the "SkyBridge Amendment").

^{3/} As discussed below, the band has also been allocated internationally to NGSO FSS systems, such as the SkyBridge System, on a co-primary basis with BSS systems.

System has been designed fully to protect GSO direct broadcast satellite ("DBS") systems operating pursuant to this GSO BSS allocation.

I. BSS/NGSO FSS FREQUENCY RE-USE

The Commission noted in the NPRM that it has received applications, including the SkyBridge Application, for NGSO FSS systems in the BSS bands, then stated that BSS/NGSO FSS frequency re-use issues are not the focus of this rulemaking. Rather, the Commission avowed that such issues "will be fully considered in future rulemakings."^{4/}

SkyBridge agrees with the Commission's decision to exclude these issues from the present rulemaking,^{5/} because the issues affect more than the DBS service that is the focus of the instant rulemaking. Nonetheless, these frequency re-use issues are of vital importance to both DBS and NGSO FSS licensees and applicants. At the World Radiocommunication Conference in 1997 ("WRC-97"), the subject bands were allocated to NGSO FSS systems on a co-primary basis with DBS systems, subject to NGSO FSS system adherence to provisional equivalent power flux-density ("epfd") and aggregate power flux-density ("apfd") limits designed to protect DBS and other GSO systems.^{6/} It is critical that U.S. allocations and rules governing such frequency re-use be adopted as soon as possible.

^{4/} NPRM, ¶ 50.

^{5/} For this reason, SkyBridge does not address herein the public interest benefits of spectrum re-use by NGSO FSS systems, nor the ability of the SkyBridge System to re-use the subject bands while fully protecting DBS systems. These issues have been addressed by SkyBridge in, inter alia, the SkyBridge Application, Section V.A.1 and Appendix B, Sections I.A and I.B; the SkyBridge Amendment, Appendix C, Section I; Reply Comments of SkyBridge, RM No. 9147, filed Sept. 11, 1997, Sections III.A and IV.B; Opposition of SkyBridge, File Nos. 48-SAT-P/LA-97, 89-SAT-AMEND-97, filed Feb. 20, 1998, Section IV.A.

^{6/} See Res. 538 (WRC-97), in Final Acts of the World Radiocommunication Conference, Geneva, 1997 at 428.

As the Commission recognized in the NPRM,^{7/} SkyBridge filed a petition for rulemaking on frequency re-use by NGSO FSS systems on July 3, 1997 (the "SkyBridge Petition").^{8/} The SkyBridge Petition was placed on public notice on July 28,^{9/} and the pleading cycle closed on September 11, 1997. Today, some seven months after the close of this pleading cycle, and four months after the close of WRC-97, no further action has been taken on SkyBridge's Petition. In accordance with the Commission's statement in the NPRM that NGSO/GSO spectrum sharing issues will be fully considered in a separate rulemaking, and in view of the critical importance to the DBS and NGSO FSS systems of resolution of these issues, SkyBridge urges the Commission expeditiously to issue a Notice of Proposed Rulemaking based on the SkyBridge Petition.

II. BSS INTER-SYSTEM INTERFERENCE

A. The Commission Should Develop Policies and Rules That Permit Entry of Future DBS and Other Systems.

The Commission is seeking comment on whether the implementation of DBS systems with technical parameters substantially different from those anticipated in the BSS plans could result in harmful interference to other systems.^{10/} The answer, of course, is "yes."

^{7/} NPRM, ¶ 50, n. 107.

^{8/} Amendment of Parts 2.106 and 25.202 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the 10.7-12.7 GHz, 12.75-13.25 GHz, 13.75-14.5 GHz, and 17.3-17.8 GHz Bands, and to Establish Technical Rules Governing NGSO FSS Operations in these Bands, Petition for Rulemaking, RM No. 9147.

^{9/} Public Notice, Report No. 2213, July 28, 1997.

^{10/} NPRM, ¶ 49.

The BSS plans were premised on a given interference environment, based on the DBS technology developed at the time.^{11/} As the Commission noted, DBS operators in the U.S. employ technical parameters corresponding to current technologies that depart in significant ways from those considered in the Region 2 plan.^{12/} Operation of DBS systems with significantly different characteristics than those considered in the plans threatens the ability of new DBS entrants to launch systems -- systems that were specifically provided for in the plans -- without receiving or causing interference to other DBS systems. In view of this situation, the Commission is correct in its suggestion that it should develop regulations to supplement those specified in the ITU Radio Regulations;^{13/} such rules are necessary to ensure that systems having characteristics not in conformity with the plans are adequately protected themselves, and do not threaten the entry of new DBS and other systems.

Of the technical parameters exhibited by U.S. systems that are not in conformity with the Region 2 BSS plan, perhaps the most significant is the use of smaller DBS receive earth station antennas than those considered in the plan. As the size of receive antennas is reduced, greater antenna performance is required to ensure that the system is

^{11/} More specifically, the BSS plans were based on the signal modulation techniques, satellite power generation capabilities, antenna patterns, and other system characteristics existing at the time, and represent a compromise between the global capacity of the GSO BSS arc and the interference level into each system based on operation of systems with such technical parameters.

^{12/} The differences cited by the Commission are: (1) use of digital modulation rather than analog, (2) lower EIRPs, (3) extended service areas, (4) larger feeder link transmit earth station antennas, and (5) smaller receive earth station antennas. NPRM, ¶ 47.

^{13/} NPRM, ¶ 47.

adequately protected when other BSS assignments are put into use, and is adequately protected from systems in other services.

It is therefore entirely appropriate that the Commission has considered whether DBS systems should be protected only to the extent they meet certain receive antenna performance standards.^{14/} Antenna gain requirements in the Commission's rules would provide a much needed incentive to DBS operators to deploy spectrum-efficient systems. So long as all of the DBS systems contemplated in the BSS plans are not deployed, the current DBS operators have substantial leeway in implementing their systems, without threat of interference to or from systems located in adjacent DBS slots. As a result, there is little incentive to implement a system in accordance with the objectives of the Region 2 BSS plan.

In this environment, any concerns DBS operators may have regarding antenna gain performance are far outweighed by the desirability of using ever smaller receive antennas. Systems with parameters not in conformity with the plans may be placing themselves and their customers in jeopardy by using equipment that may not be adequately protected, due to poor antenna isolation, from other DBS systems or other services using the bands.^{15/}

Furthermore, the lack of enforceable antenna performance requirements permits U.S. DBS systems to be wasteful of spectrum resources, with no adverse consequences, unless and until adjacent orbital locations are occupied, by which time the

^{14/} Id., ¶ 51.

^{15/} As discussed further below, a system not in conformity with the relevant plan is protected under the plan only when a modification is entered into the plan. See ITU Radio Regulations, Appendix S30, Appendix 4 and Annex 1.

damage will have already been done. It is of critical importance to the DBS community itself, as well as other satellite and terrestrial services re-using the same spectrum, that the DBS systems not create a completely different interference environment from that originally planned for BSS systems.^{16/} Antenna gain performance standards, as suggested by the Commission, would ensure efficient use of the spectrum, thereby preserving valuable spectrum resources for future entrants.^{17/}

More specifically, in order to optimize use of the GSO BSS spectrum resources, smaller DBS receive antennas should be required to satisfy sidelobe characteristics significantly more stringent than those defined at the 1983 Regional Administrative Radio Conference for 1 meter antennas. Recommendation ITU-R BO.1213, adopted at the 1997 ITU Radiocommunication Assembly for the updated plans for Regions 1 and 3, could be used as a minimum; however, even better performance could likely be obtained using more advanced technologies.

^{16/} This is not to say that modified systems should not be permitted. As discussed further below, Appendices S30 and S30A provide appropriate procedures and criteria for introducing nonconforming systems into the BSS plans. However, interference protection requirements and interference budgets must be reviewed to account for the evolution of the interference environment due to the evolution of technologies.

^{17/} Another reason for implementing antenna performance standards is to ensure efficient spectrum use by such future entrants. In particular, such a rule would help address the technical considerations arising from proposals to use BSS orbital assignments of other administrations with modified coverage areas to provide service to the U.S. See Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Space Stations to Provide Domestic and International Satellite Service in the United States, Report and Order, FCC 97-399 (Nov. 26, 1997), ¶¶ 7-8.

B. The Commission Should Address in its Policies and Rules the Conditions Under Which, and the Extent to Which, Modified U.S. DBS Systems Should be Protected by Other Systems.

Under the Region 2 BSS plan, a modification to the plan must be sought for any U.S. DBS system whose technical parameters differ from the planned assignments, including differences that in any way cause more interference than the current U.S. planned assignments to other assignments in any of the plans or to other services operating at the same frequencies. Until the modification is entered into the plan, no protection is afforded to the system.

The Commission has proposed a new Section 25.146(f), which would incorporate into the Commission's rules the need to follow such procedures for systems having parameters not in conformity with the Region 2 plan. Specifically, the Commission's proposed rule would provide that, until a system completes the Article 4 modification procedures of Appendices S30 and S30A, and has been entered into the Region 2 plan, the operation cannot cause harmful interference to assignments that conform to the plans or other services sharing the same frequency bands, nor can it receive protection from assignments that conform with the plans or other services sharing the same frequencies. The proposed provision would be a valuable addition to the Commission's rules, as it would provide much needed enforcement of the BSS plan modification provisions.^{18/}

^{18/} The Commission should consider whether the proposed rule will adequately protect modified DBS systems, other DBS systems, and other services in the band, if the Commission permits operation of a system not in conformity with the plan for which a mere request to the ITU has been made to modify the appropriate plan. Although the Commission's proposed rule would require an "adequate technical showing," NPRM, Appendix A, § 25.146(f), it is far from clear what such a showing would
(continued...)

In addition to determining at what stage a U.S. DBS system not in conformity with the Region 2 plan should receive protection, the Commission should address in its regulations the extent to which such a system should be protected by other DBS systems and systems of other services.^{19/} Most importantly, in undertaking such

^{18/}

(...continued)

entail. In the NPRM, the Commission stated that it will consider nonconforming systems "if there are reasonable assurances that the agreement of the affected administration(s) can be obtained." NPRM, ¶ 45. However, the only example provided of what could constitute "reasonable assurances" is a showing that "the effect on foreign system(s) is negligible." Id., n.95. Of course, what a U.S. applicant may claim as a "negligible effect" may be viewed quite differently by a foreign administration; that administration's agreement cannot be presumed from an alleged "negligible effect." The Commission should seek to articulate the technical showing that will be required, and incorporate the criteria into the proposed rule.

^{19/}

The Commission stated that certain proposals were put forward at WRC-97 to protect DBS systems "only to the technical parameters on which the plans were based." NPRM, ¶ 49. With regard to protection of GSO BSS systems from NGSO FSS systems, it should be noted that CMR97/Document 62-E (Operation of Nongeostationary Satellite Systems in the Fixed-Satellite Service in the Frequency Bands from 10.7 to 30 GHz, Proposal for the Work of the Conference, France, Oct. 7, 1997) contains proposed efpd and apfd values considered to protect a range of system types. The proposal itself notes that "the technical elements associated [with] the proposed limits . . . have been developed to ensure full protection of Appendix S30 and S30A plans as well as their future evolution." CMR97/Document 62-E, p. 22 (emphasis added). The proposal goes on to provide a detailed analysis of how these values would protect a range of GSO BSS systems, both those in the original plans as well as modified systems, and states that such an analysis is required "since the characteristics of GSO BSS assignments actually implemented may differ from the nominal levels assumed in the plans." Id., p. 27. WRC-97 created ITU-R Joint Task Group 4-9-11 to determine whether the provisional efpd and apfd limits adopted at the conference protected both assignments and modifications to the Appendix S30 and S30A plans. At the recent meeting of the Joint Task Group, the group asked that Administrations provide "detail of characteristics of BSS systems using the Plans as well as those being considered for future Plan modifications." Document 4-9-11/TEMP/10(Rev.1)-E (emphasis added). This work demonstrates the importance of understanding the technical characteristics of GSO BSS systems that will actually be implemented, in order to determine the appropriate protection criteria and, consequently, appropriate efpd and apfd limits.

analysis, the Commission should ensure that the protection requirements take into consideration the actual characteristics of the DBS system to be protected.

It is wholly inappropriate to apply to modified BSS systems protection criteria that have been derived for BSS systems having the reference parameters contained in the plans. For example, the power flux-density masks contained in the plans, such as those specified in Annex 4 of Appendix S30, were developed to protect reference BSS systems, taking into account the carrier characteristics contained in the plans. It would be completely arbitrary to apply them to modified systems, because they are not linked in any way to the protection requirements of such systems.^{20/}

Such considerations were taken into account in the recent revisions of the Region 1 and 3 BSS plans, concluded at WRC-97. The plans were revised to incorporate updated technical parameters to assignments in the plan.^{21/} As part of this revision, new protection levels were derived to permit the entry of such updated systems. Specifically, lower aggregate, single-entry, and adjacent channel C/I values were adopted for such systems, based on their protection requirements.^{22/} In a similar manner, the Commission

^{20/} For example, based on technology existing at the time the Region 2 BSS plan was formulated, the BSS systems were assumed to operate with a C/N of 14 dB and a reference aggregate C/I from adjacent systems of 28 dB. With new modulation schemes, the required C/N is about 9 dB, and a C/I of 22 dB would generate the same impact as a C/I of 28 dB on a C/N of 14 dB. This example illustrates the need to adjust the rules applicable to DBS systems to take into account 15 years of technology evolution.

^{21/} These included improved receiving earth station antennas based on Rec. ITU-R BO.1213.

^{22/} Appendix S30 (WRC-97).

should develop new protection criteria applicable to modified U.S. DBS systems entered into the Region 2 plan that take into account the actual requirements of such systems.

III. CONCLUSION

For the foregoing reasons, the Commission should expeditiously release a notice of proposed rulemaking addressing NGSO FSS/BSS frequency re-use based on the SkyBridge Petition. Furthermore, the Commission should seek to adopt policies and rules governing the DBS service that encourage efficient use of the BSS spectrum and orbital resources.

Respectfully submitted,

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